

What is Claimed Is:

1. An isolated nucleic acid comprising an isolated avian gut-specific gene expression control region comprising a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1, SEQ ID NO: 2, or a degenerate variant thereof.
2. The isolated nucleic acid of Claim 1, wherein the avian is selected from the group consisting of a chicken, a turkey, a duck, a goose, a quail, a pheasant, a ratite, an ornamental bird or a feral bird.
3. The isolated nucleic acid of Claim 1, wherein the avian is a chicken.
4. The isolated nucleic acid of Claim 1 comprising the sequence SEQ ID NO: 1.
5. The isolated nucleic acid of Claim 1 comprising the sequence SEQ ID NO: 2.
6. The isolated nucleic acid of Claim 1 comprising a sequence at least 75% identical to SEQ ID NO: 1.
7. The isolated nucleic acid of Claim 1 comprising a sequence at least 95% identical to SEQ ID NO: 1.
8. The isolated nucleic acid of Claim 1 comprising a sequence at least 99% identical to SEQ ID NO: 1.
9. The isolated nucleic acid of Claim 1 comprising a sequence at least 75% identical to SEQ ID NO: 2.
10. The isolated nucleic acid of Claim 1 comprising a sequence at least 95% identical to SEQ ID NO: 2.
11. The isolated nucleic acid of Claim 1 comprising a sequence at least 99% identical

to SEQ ID NO: 2.

12. A recombinant DNA molecule comprising an isolated avian gut-specific gene expression control region operably linked to a nucleic acid insert encoding a polypeptide.

13. The recombinant DNA molecule of Claim 12, wherein the avian is selected from the group consisting of a chicken, a turkey, a duck, a goose, a quail, a pheasant, a ratite, an ornamental bird or a feral bird.

14. The recombinant DNA molecule of Claim 12, wherein the avian is a chicken.

15. The recombinant DNA molecule of Claim 12, wherein the gut-specific gene expression control region comprises a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1, SEQ ID NO: 2, , or a degenerate variant thereof.

16. The recombinant DNA molecule of Claim 12, wherein the gut-specific gene expression control region comprises the nucleic acid sequence SEQ ID NO: 1, or a degenerate variant thereof.

17. The recombinant DNA molecule of Claim 12, wherein the gut-specific gene expression control region comprises the nucleic acid sequence SEQ ID NO: 2, or a degenerate variant thereof.

18. The recombinant DNA molecule of Claim 12, further comprising a polyadenylation signal sequence.

19. The recombinant DNA molecule of Claim 18, wherein the polyadenylation signal sequence is derived from the SV40 virus.

20. The recombinant DNA molecule of Claim 12, wherein the nucleic acid insert

encoding a polypeptide has a codon complement optimized for protein expression in an avian.

21. The recombinant DNA molecule of Claim 12, further comprising an origin of replication selected from a bacterial origin of replication or a viral origin of replication.

22. The recombinant DNA molecule of Claim 12, wherein the recombinant DNA molecule is a plasmid.

23. The recombinant DNA molecule of Claim 12, wherein the recombinant DNA molecule is a virus.

24. An expression vector that integrates into a host cell and comprising an isolated avian gut-specific gene expression control region operably linked to a nucleic acid insert encoding a polypeptide, wherein the expression control region directs production of a transcript.

25. The expression vector of Claim 24, wherein the avian is selected from the group consisting of a chicken, a turkey, a duck, a goose, a quail, a pheasant, a ratite, an ornamental bird or a feral bird.

26. The expression vector of Claim 24, wherein the avian is a chicken.

27. The expression vector of Claim 24, wherein the avian gut-specific gene expression control region comprises a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1, SEQ ID NO: 2, or a degenerate variant thereof.

28. The expression vector of Claim 24, wherein the avian gut-specific gene expression control region comprises the nucleic acid sequence SEQ ID NO: 1, or a degenerate variant thereof.

29. The expression vector of Claim 24, wherein the avian gut-specific gene expression control region comprises the nucleic acid sequence SEQ ID NO: 2, or a degenerate variant thereof.
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30. The expression vector of Claim 24, further comprising a polyadenylation signal sequence.
31. The expression vector of Claim 30, wherein the polyadenylation signal sequence is derived from the SV40 virus.
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32. The expression vector of Claim 24, wherein the nucleic acid insert encoding a polypeptide has a codon complement optimized for protein expression in an avian.
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33. The expression vector of Claim 24, wherein the expression vector is selected from the group consisting of a plasmid and a virus.
34. A method of expressing a heterologous polypeptide in a host cell, comprising the steps of:
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- (a) transfecting a eukaryotic cell with a recombinant DNA molecule comprising an avian gut-specific gene expression control region, thereby generating a transfected cell;
- (b) culturing the transfected cell in a medium suitable for expression of a heterologous polypeptide under the control of an avian iFABP or cp35 gene expression control region encoded by the recombinant DNA molecule.
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35. The method of expressing a heterologous polypeptide in a host cell of Claim 34, wherein the avian gut-specific gene expression control region comprises a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1, SEQ ID NO: 2, or a degenerate variant thereof.
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36. The method of expressing a heterologous polypeptide in a host cell of Claim 34, wherein the eukaryotic cell is derived from an avian.

5 37. The method of expressing a heterologous polypeptide in a host cell of Claim 34, wherein the eukaryotic cell is derived from a chicken.

38. A eukaryotic cell transformed with the expression vector according to Claim 24, or a progeny of the cell, wherein the cell or the progeny thereof expresses a heterologous polypeptide.
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39. The eukaryotic cell of Claim 38, wherein the cell is an avian cell.

40. The eukaryotic cell of Claim 38, wherein the cell is an chicken cell.
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41. The eukaryotic cell of Claim 38, wherein the cell is a cultured cell.

42. The eukaryotic cell of Claim 38, wherein the expression vector has a nucleic acid insert encoding a polypeptide, and wherein the nucleic acid insert has a codon complement optimized for protein expression in an avian.
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43. A transgenic avian having a heterologous polynucleotide sequence comprising a nucleic acid insert encoding the heterologous polypeptide and operably linked to an avian gut-specific gene expression control region.
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44. The transgenic avian of Claim 43, wherein the avian is selected from the group consisting of a chicken, a turkey, a duck, a goose, a quail, a pheasant, a ratite, an ornamental bird or a feral bird.

30 45. The transgenic avian of Claim 43, wherein the avian is a chicken.

46. The transgenic avian of Claim 43, of expressing a heterologous polypeptide in a

host cell wherein the avian gut-specific gene expression control region comprises a nucleic acid sequence selected from the group consisting of SEQ ID NO: 1, SEQ ID NO: 2, or a degenerate variant thereof.

5 47. The transgenic avian of Claim 44, wherein the transgenic avian further comprises a polyadenylation signal sequence.

48. The transgenic avian of Claim 44, wherein the polyadenylation signal sequence is derived from the SV40 virus.

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49. The transgenic avian of Claim 44, wherein the nucleic acid insert encoding a polypeptide has a codon complement optimized for protein expression in an avian.